

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)	
)	
Amendment of Parts 1, 21, 73, 74, and 101 of the)	
Commission's Rules to Facilitate the Provision of)	WT Docket No. 03-66
Fixed and Mobile Broadband Access, Educational)	RM-11614
and Other Advanced Services in the 2150-2162)	
and 2500-2690 MHz Bands)	
)	

Comments of IPWireless, Inc.

IPWireless, Inc. ("IPWireless") hereby submits Comments in response to the Fourth Further Notice of Proposed Rulemaking Public Notice (NPRM)¹.

I. Background

IPWireless is a developer and manufacturer of 3GPP Network infrastructure and User Equipment. The company currently supplies 3GPP Release 8 Long Term Evolution ("LTE") User Equipment ("UE"), including products operating in 3GPP Band Class 38 (2600 MHz in Europe) and other international markets.

In previous Reply Comments in response to a Public Notice inviting comments on Wireless Communications Association Int'l ("WCAI") Petition to Amend Section 27.53(m) of the

¹ FCC 11-81

Commission's Rules², IPWireless indicated our opposition to any proposals that seek to allow increased interference in any band especially when there is no valid technical reason for doing so. In support of our position, IPWireless provided detailed technical evidence including emission measurements of commercially supplied mobile devices.

We reiterate that our position is entirely focused on concern about increasing interference, especially in an unpaired band where there may be uncoordinated Time-Division-Duplex (TDD) systems operating adjacent to each other.

Claims that IPWireless does not commercially supply fully compliant 3GPP Release 8 LTE supporting 20MHz operation were subsequently refuted in communication with the FCC³.

II. Comments on Notice of Proposed Rule Making

IPWireless supports operation with wider channels (such as 20 MHz) in the EBS/BRS band, as well as in other bands. Additionally, as an active member of the 3GPP community, we encourage the adoption of standards based technologies. However, we strongly oppose any change to regulations that would allow increased interference in any band. As IPWireless has shown previously, wider channel bandwidths can be achieved in miniature commercial UE products without degrading spectral efficiency through increased interference. Rather than having the desired effect of increasing spectral efficiency through wider channels, the proposed emission mask relaxation is likely to reduce spectral efficiency through forcing licensees to implement guard bands to avoid interference between uncoordinated TDD systems.

Guard bands are not required if systems used by adjacent operators utilize the same technology / standard, and coordinate forward and reverse link allocations in the time domain. However the Commission's rules do not require a single standard, and it cannot assume all TDD systems in the band will use the same standard or be coordinated. In the EBS/BRS band there are already at least two different standards deployed and in operation, and more can be expected with the introduction of TD-LTE (Time Division Duplex LTE). All of these standards use different frame structures in the time domain, rendering coordination difficult or practically impossible in some cases. Even with like standards used in adjacent systems, coordination to avoid interference requires that the same forward / reverse link allocations be used, which may not be practical given the different traffic patterns of broadband systems. For instance, a Government network has different traffic usage requirements than commercial systems providing services to the public.

As described in IPWireless' previous comments⁴, it is possible to economically produce a small form factor device capable of operating with a 20MHz channel bandwidth that fully meets the

² RM-11614

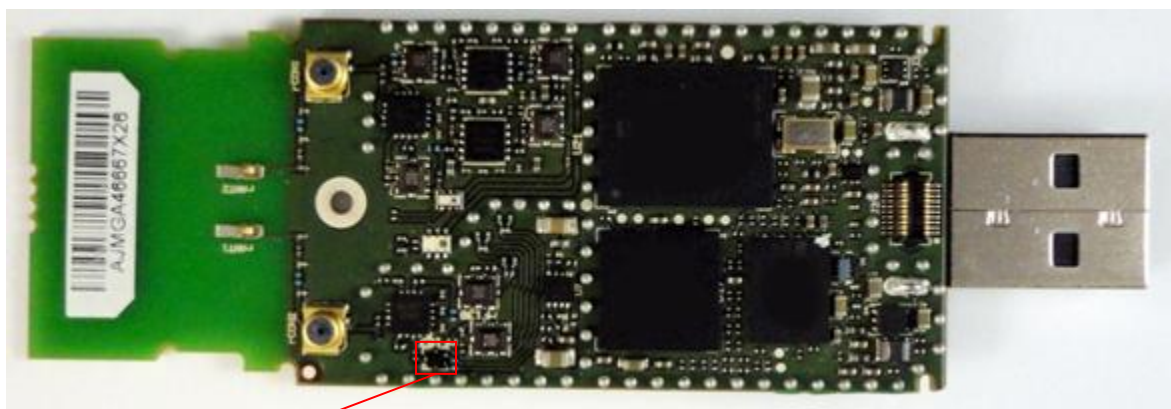
³ Letter from Roger Quayle, CTO, IPWireless, Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission (filed Dec. 21, 2010) (IP Wireless December 21 *ex parte*)

⁴ Comment of IPWireless to RM-11614 (filed Dec 3, 2010) (IPWireless Comments)

Commission's current Out-of-band-Emissions ("OOBE") specifications for the EBS/BRS bands. In support of this claim, IPWireless presents photographs of our UE in USB form factor. The device shown is a fully compliant 3GPP Release 8 LTE USB stick supporting multiband operation, and in commercial use in Europe. The bands supported include 3GPP Band 20 (800MHz), Band 3 (1800MHz), and Band 38 (2600MHz). Most pertinent to this matter is the support for Band 38. However, it is important to note that all three bands are supported in the competitive mobile form factor depicted.

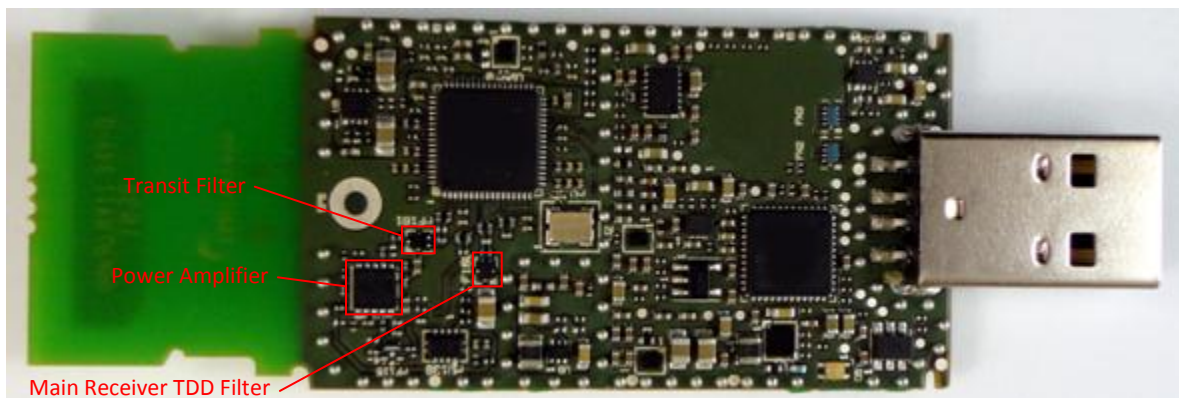
The photographs in Figure 1 and Figure 2 clearly show the RF components of the USB stick required for Transmit and Receive in the 2600 MHz band:

- Power Amplifier
- Transmit Filter
- Receive Filters (Main & Diversity)



Diversity Receiver TDD Filter

Figure 1 LTE USB - Top Side



Main Receiver TDD Filter

Figure 2 LTE USB - Bottom Side

The components shown directly drive the RF performance of the UE including OOB. The RF performance shown in IPWireless' previous Reply Comments⁵, which exceeded the current OOB specifications, were measured using this device and the associated components. Therefore, the RF components required to meet the current specifications in the 2600MHz band can be shown to take up minimal foot-print thereby being a viable solution in a range of small mobile form factors. Furthermore, these are commercially available off the shelf components.

To address the Commission's concern regarding whether *"the existence of some mobile devices capable of operating on 20 MHz channels and meeting the current FCC OOB rules affect the necessity or desirability of making the proposed rule changes"*, our objective in showing commercial product capable of meeting the current mask in a wider channel bandwidth is to provide input to the decision, balancing between maximizing spectral efficiency through reduced interference and device capabilities. While it would be detrimental to the industry to set forth regulations that were technically or economically burdensome to meet, the presence of some mobile devices based on standards based technology and using commercially available RF components provide a strong indication with regard to the state of technology, and therefore provide a justification for regulations that will maximize spectral efficiency in the band going forward.

Regarding the impact of the proposed rules on the increased likelihood of interference, we refer back to the CEPT Report⁶. Due to the TDD use of the EBS/BRS band, all four interference conditions listed below are possible:

- BS – to – BS
- BS – to – UE
- UE – to – BS
- UE – to – UE

The impact of any given interference condition will be driven by the relative locations of the interfering transmitter and the victim receiver. Relaxing the OOB emission mask of the mobile device, will negatively impact the interference associated with the third and fourth conditions above. However, the exact impact will be driven by receiver performance and relative geometries of equipment in overlapping geographies.

Based on our understanding of the CEPT report and subsequent EU regulations in the 2500-2690MHz band, the "mitigation techniques or coordination" referred to by the report⁷ are separate matters from the establishment of 5MHz guard channels. Possible techniques include additional base station filtering or TDD synchronization. While a filtering approach, in line with

⁵ IPWireless Comments (filed Dec 3, 2010)

⁶ Report from the European CEPT to the European Commission in response to the Mandate to develop least restrictive technical conditions for frequency bands addressed in the context of WAPECS, CEPT Report 19 (Oct. 30, 2008) (available at <http://www.ero-docdb.dk/Docs/doc98/official/pdf/CEPTREP019.PDF>)

⁷ *Id.* at 41

the commission's rules for a tightening base station emission mask if high levels of interference are reported, would alleviate interference related to the first two interference conditions above, it provides no benefit to the third and fourth interference scenarios. Though base stations do operate with significantly more power than UE, the statistical nature of interference does not preclude harmful levels of interference from a UE to either BS or UE. A relaxed mask would require larger separation between interfering UE and victim receivers to avoid interference. Annex IV of the report describes TDD synchronization as an example of a possible coordination that could relax either the guard band requirement or Block Edge Mask ("BEM"): *"In cases where licensees choose to coordinate, including the case of synchronized TDD, such coordination could include an agreement to enable the restricted block to be operated as an unrestricted block. In addition, if licensees choose to coordinate they can relax the baseline requirement level within their respective blocks."*⁸ However, given the disparate technologies in use in the band and varying traffic usage requirements, such synchronization would be unlikely to occur.

As stated in the definition of the various models considered in the report for restricting emissions, a BEM is more than a spectrum mask but also defines minimum frequency separations.⁹ As such, the approach recommended in the report relies on combined emission masks and guard bands to manage the likelihood of interference. The intent of the report further clarified in the application of the CEPT recommendations in the resulting EU regulations for the 2500-2690 MHz band where it is stated that: *"To achieve compatibility a separation of 5 MHz is needed between the edges of spectrum blocks used for unrestricted TDD (time division duplex) and FDD operation (frequency division duplex) or in the case of two unsynchronized networks operating in TDD mode"*.¹⁰

While we are not advocating an identical approach to the above for the EBS/BRS band, in citing these recommendations and associated regulations, we simply want to acknowledge that a combination of more restrictive spectrum masks or guard bands reduce the risk of interference in the case of uncoordinated TDD systems.

III. Conclusion

In summary, IPWireless continues to strongly oppose any relaxation of the mobile device emission mask in the EBS/BRS band on the basis of not causing any increase in interference. The existence of a small mobile form factor device that is fully standards compliant and capable of meeting the existing emission mask with wider channels should indicate that current technology can maximize spectral efficiency by keeping within current regulations. As acknowledged in other markets, the adoption of relaxed emission masks would increase the

⁸ *Id.* at 73

⁹ *Id.* at 29

¹⁰ Commission Decision of 13 June 2008 on the harmonization of the 2500-2690 frequency band for terrestrial systems capable of providing electronic communications services in the Community) (2008/477/EC) (available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:163:0037:0041:EN:PDF>) at 2 (provision 8)

potential for interference requiring alternate techniques to manage interference, which may be wasteful of spectrum. Given the focus on mobile devices and hurdles to network TDD synchronization, maintaining the current emission mask will maintain the least likelihood of interference and therefore maximize the throughput achievable in the band.

Respectfully submitted,

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